**Model description**

This file describes the computations with the probabilities in the health state transition (Markov) model. P stands for probability, between brackets the event is described. For notation purposes transition probabilities are attached to a letter in table 1, vertically are the initial state and horizontally are the destination states. Hence A is the probability of staying in NYHA class I or II and B is the probability of moving from NYHA I or II to NYHA III or IV. In equations the use of abbreviations for the Markov states is used according to table 2.

The sum of a horizontal row has to be 1 since the probability that one of the four possible events will happen is 100%, the probability that only event A will happen and not B, C and D is described in equation 1.

Table 1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | NYHA I or II | NYHA III or IV | Hospital | Dead |
| NYHA I or II | A | B | C | D |
| NYHA III or IV | E | F | G | H |
| Hospital | I | J | K | L |
| Death | M | N | O | P |

Table 2

|  |  |
| --- | --- |
| Markov state | Abbreviation |
| NYHA class I or II | N 1,2 |
| NYHA class III or IV | N 3,4 |
| Hospital | Hosp |
| Dead | Dead |

Equation 1

In the computations used in this study a cohort of patients is simulated, probabilities are thus proportions of the cohort that experience one of the possible events. At the end of each turn the group simulation patients in a Markov state represents the probability of moving to that state multiplied by the volume of the state of origin before simulation (equation 2). In equation 2 Vt-1 stands for the amount of patients before the last simulation round and Vt stands for the current amount, between brackets is the state to which the volume is referring. Since probability M equals 0, the proportion simulation patients moving from the dead state to NYHA class I or II, it can be excluded from equation 2 (this is included as assumption; dead people cannot revive and live again).

Equation 2

The equation 2 can also be created for the other Markov states; NYHA III or IV (equation 3), Hospital (equation 4) and Death (equation 5).

Patients that are dead in the simulation cannot go to another Markov state because being dead is assumed irreversible, thus the probability to stay in the Markov state dead is 1 (P=1). This results that M, N and O in table 1 are equal to zero, thus these probabilities multiplied by the volume of the death state is zero. Since we assume that a simulation patient can only stay in the hospital state for 1 turn probability K is also zero. As a result of these assumptions we can exclude these parts of the calculations in the equations.

Equation 3

Equation 4

Equation 5

In the equations we can see that the amount of patients of each Markov state is dependent upon probabilities and volumes of all Markov states in the past turn. As a result, the amounts before simulating, V0, will distribute itself among all the states during simulation. Because there is an absorbing state, a state with zero probability of leaving it, eventually all simulation patients will reach it after infinite simulation turns.